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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/912,923	07/25/2001	James M. Tour	1789-05303	5497

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EXAMINER	
SKIBINSKY, ANNA	
ART UNIT	PAPER NUMBER
1631	

MAIL DATE	DELIVERY MODE
10/13/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/912,923	TOUR ET AL.	
	Examiner	Art Unit	
	ANNA SKIBINSKY	1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 June 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *56-76* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *56-76* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date. _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Applicants' arguments, filed 6/01/2009, have been fully considered but they are not deemed persuasive. Rejections and/or objections not reiterated from previous office actions are hereby withdrawn. The following rejections and/or objections are either reiterated or newly applied. They constitute the complete set presently being applied to the instant application.

Claims 58-76 have been amended and under examination. Claims 1-57 have been cancelled.

Priority

1. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Priority of US application 60/220,790 filed 7/25/2000 is acknowledged. Priority is given on the basis that 60/220,790 discloses providing a self-assembled nanocell comprising an input lead, output lead and a random nano-network, programming the nano-cell, and configuring the molecular circuit components of the nano-cell.

Specification

2. Amendments to the specification to correct minor informalities have been considered.

Claim Rejections - 35 USC § 112-2nd paragraph

1. The instant rejection is necessitated by amendments filed 6/01/2009.

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 58-76 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 58 recites that that "plurality of nanoparticles are arrayed with little or no order". It is unclear as to which plane the nanoparticles are arranged on that have little or no order. Because a cell typically is three dimensional, it is unclear as to where the little or no order should exist in a cell. Long chain molecules that make up a monolayer are by nature disordered with respect to their side chain molecules which rotate and vibrate lending to the disorder of their arrangement.

5. Claim 58 recites nanoparticles that are arrayed. It is not clear what applicants intend to be nanoparticles. The system as claimed is a "nanocell" therefor all of the molecular components meet the limitation of being nanoparticles. This renders the limitations of the claim as vague and indefinite because it is not clear which "nanoparticle" molecular components are arrayed with little or no order

6. Claim 58 recites "nanocell", it is unclear as to what applicants intend to be a nanocell and whether it should be a three dimensional enclosed unit, as in the ordinary meaning of a cell or something otherwise. .

Claim Rejections - 35 USC § 103

7. The rejection of claims 58-76 under 35 U.S.C. 103(a) as being unpatentable over Seminario et al. in view of Tour et al. is withdrawn.

8. The following rejection is necessitated by amendments filed 6/01/2009.

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 58-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seminario et al. (J. Am. Chem. Soc., vol. 122 (March, 2000) pgs. 3015-3020) in view of Tour et al. (J. Am. Chem. Soc., vol. 120 (1998) pgs. 8480-8493 in further view of Reed et al. (US Patent 6,756,605).

12. The instant claims are drawn to a method of making an electronic component comprising (a) providing a a self-assembled nanocell with an input and output lead, a random nano-network spanning the leads, wherein the nano-network comprises the plurality of nanoparticles arrayed with little or no order; and (b) programming the self-assembled nanocell by configuring the molecular circuit components by mortal switching.

13. Seminario et al. teach self assembled molecules within a nanopore (i.e nanocell) (page 3015, col. 1 and page 3016, Figure 2), as in "providing a self assembled nanocell", wherein the molecules are self assembled (page 3015, col. 1, ¶1 and 3018, col. 1, ¶3), as in claim 58, step (a).

14. Seminario et al. teach that the random self assembled molecules (i.e. a random nano-network spanning input lead and output lead) are connected to the gold surface (input lead) on one end of the nanocell and through sulfur atoms to the lower surface (location of output lead)(page 3016, Figure 2 caption), as in claims 58, step (a) and 74.

15. Seminario et al. teach that voltage is passed through the molecules (i.e. molecular circuit components, nanoparticles connected to provide electrical continuity) (Abstract and Figure 1), as in claims 58, step (a) and claim 74.

16. Seminario et al. make obvious the compound 2',5'-dinitro-4,4'-diphenyleneethynylene-1,4"-benzenedithiol (page 3018, Figure 3 (f)) of claim 60.

17. Seminario et al. teach sulfur atoms as alligator clips, claims 74 and 75.

18. Seminario et al. teach negative differential resistance (Introduction, page 3015, ¶1), as in claim 63.

19. Seminario et al. teach testing the performance of a nanocell wherein experimental current-voltage characteristics are measured (e.g. Figure 1), as in claims 66 and 69, step (b2).

20. Seminario et al. teach a nanocell with a linear dimension between 1nm and 2microm, (wherein it is known in the art that the length of a bond in a benzene ring is 139 pm) (Figure 2), as in claim 76.

21. Seminario et al. do not teach programming the self assembled nanocell and configuring the molecular circuit components by mortal switching, as in claim 58, step (b). Furthermore, Seminario do not teach molecular switches and diodes as in claims 59, 61, 62; conjugated molecular segments as in claim 64; electronic state as in claim 65; a self adaptive algorithm as in claims 67, 68, 69, step (b3); a logic unit as in claims 70 and 72; truth tables as in claim 71; a memory and a CPU (page 8487, col. 1, ¶1) as in claim 73.

22. Tour teaches changes in electrostatic potential for information coding (i.e. programming to a desired state), as in claim 58, step (b).

23. Tour however teaches configuring a plurality of molecular circuit components (page 8487, col. 2 ¶ 4) and molecular devices configured to behave as electronic devices (Abstract). Tour et al. teach input and output current (page 8487, col. 1, ¶3) and voltage in and voltage out (page 8487, col. 2, ¶2) and input and output gates (page 8488, col. 2, ¶2) (i.e. input and output leads), as required in claim 58, step (b).

24. In another embodiment of claim 58, Tour et al. also teach a random nano-network of molecular circuit components and making adjustment of a conductivity

affecting property of the molecular circuit components in that the electron density is reshaped due to the input signals (page 8488, col. 1, ¶2). Tour et al. teach possibility of self-assembly of the molecular circuit elements (page 8493, col.2, ¶2).

25. Tour et al. teach molecular switches (Abstract and page 8486, col. 1, ¶1), as in claim 59 and resonant tunneling diodes (Abstract and page 8487, col. 1, ¶2), as in claim 62.

26. Tour et al. teach switches connected to input and output lead for receiving signals (page 8487, col. 1, ¶2, mid-paragraph), as in claim 61.

27. Tour et al. teach conjugated molecules (Abstract and page 8489, col. 1, ¶2), as in claim 64.

28. Tour et al. teach electron density is reshaped due to the input signals (page 8488, col. 1, ¶2) (i.e. conformational state), as in claim 65.

29. Tour et al. teach a self-adaptive learning algorithm wherein in the input potential applied is such that that molecular potential barrier is above a threshold, the electron density will be reshaped (page 8490, col. 1, ¶ 2 to page 8491, col. 1, ¶ 1), as in claims 67, 68, 69, step (b3)

30. Tour et al. teach a logic unit that is a bit adder (page 8486, col. 2, ¶2) and AND,OR, NOR, NAND (page 8490, Figure 5), as in claims 70 and 72.

31. Tour et al. teach logic tables (i.e. truth tables) (page 8490, col. 2, Figure 5), as in claim 71.

32. Tour et al. teach a memory and a CPU (page 8487, col. 1, ¶1), as in claim 73.

33. Seminario in view of Tour do not teach nanoparticles that are arrayed with little or no order, as recited in claim 1.

34. Reed et al. however teach molecular scale electronic devices with at least two conductive contacts spanned by "conductive paths" (long molecules) with electron withdrawing groups (col. 4-5) that can be formed into monolayers on a contact surface and assembled with an irregular arrangement (i.e. with little or no order)(col. 7, lines 33-53).

35. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have implemented the method of making a nanopore (i.e. a nanocell) from self-assembled nanoparticles as taught by Seminario et al. with the method of using programmable molecular diodes as configurable molecular circuit components as taught by Tour et al. One of skill in the art would have been motivated to use the method as taught by Seminario et al. with that of Tour et al. because Tour et al. teach the usefulness of molecular devices as components of computational devices (page 8486, col. 1, ¶1) and the use of self-assembling particles (page8593, col. 2, ¶2). One of skill in the art would have had a reasonable expectation of success at utilizing the method of Seminario et al. with that of Tour et al. because both teach organizing molecules to be used as electronic components.

36. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have implemented the method of making a nanopore (i.e. a nanocell) from self-assembled nanoparticles with the method of using programmable molecular diodes as configurable molecular circuit components as taught by Seminario

et al. in view of Tour et al. One of skill in the art would have been motivated to use the method as taught by Seminario et al. in view of Tour et al. with that of Reed et al. because Reed et al. teach that an irregular arrangement will maximize the use of space on the contact or substrate (col. 7, lines 51-53). One of skill in the art would have had a reasonable expectation of success at utilizing the method of Seminario et al., Tour et al., and Reed et al. because they all teach organizing molecules to be used as conductive components.

Response to Arguments

1. Applicant's arguments filed 6/01/2009 have been fully considered but they are not persuasive.

2. Applicants have argued that Seminario et al. teach a continuous crystalline lattice layer on the top and bottom gold surface and therefore do not teach a nanoparticles arrayed with little or no order. Applicants also argue that Seminario et al. do not teach nanoparticles between the at least on input lead and at least one output lead.

3. In response, Seminario et al. teach long molecules attached to a top and bottom gold surface which serve as an input and output lead, respectively. The long chain molecules are on the order of less than or about 100's of nanometers and can therefor be considered nanoparticles which span the input and output lead. Furthermore, these molecules spanning the gold input and output lead are disordered in the horizontal direction. They have side chain molecules that rotate and vibrate are not arrayed in any particular order. Therefor, the teaching of Seminario et al. reads on the breadth of the instant limitation.

4. Furthermore, the art of Reed et al. specifically teaches molecules which are arranged are conductive components and are assembled with an irregular arrangement.

Conclusion

No claims are allowed.

1. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anna Skibinsky whose telephone number is (571) 272-4373. The examiner can normally be reached on 8 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marjorie Moran can be reached on (571) 272-0720. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Anna Skibinsky /AS/

Examiner, Art Unit 1631

/John S. Brusca/

Primary Examiner, Art Unit 1631